


AVIATION WEEK

A MCGRAW-HILL PUBLICATION

AUG. 27, 1951

50 CENTS



Picture of a Honeywell Engineering Laboratory !

At the moment the cockpit of this B-36 is literally a test lab—to the Honeywell Service Engineer at right. He's flight-testing the Honeywell E-6 Autopilot that's standard equipment on the world's biggest bomber.

Every day at air fields across the country similar checks are conducted by our Aeronautical Service Engineers. These men also make operating tests on Honeywell Turbo-regulators, Electronic Fuel Gauges and other equipment—in dozens of different kinds of aircraft. Based on data gathered in the air, our Service Engineers make recommendations to Honeywell's design and development engineering staff on how to improve the performance of Honeywell equipment.

Flight-testing controls represents just one phase of Honeywell's famous "follow through" program. Beginning in Honeywell's research laboratories, this program continues into aircraft plants where controls are engineered individually to each airplane model, goes on through flight testing and the training of Air Force maintenance crews. It ends only when the equipment is superseded by improved models.

We expect our staff of Service Engineers to grow larger in future years. Because *automatic control* is so important a part of aviation progress. And *automatic control* is Honeywell's business.

AERONAUTICAL DIVISION
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MINNEAPOLIS
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Hydro-Aire



On the airlines, too...every transport from DC-3s to the newest trans-oceanic airliner is Hydro-Aire equipped. In fact, every American fighter, every bomber, every transport carries precision-built and engineered Hydro-Aire equipment. Hydro-Aire, Inc., Burbank, California.

B.F. Goodrich



Easier way to fly a plane ...or fix one

LOCKHEED ENGINEERS were looking for a way to seal the gap between elevators and ailerons on the P-51 "Mustang", then under controls enter to operate. A flap and—long strip of coated fabric—would do the trick. But an elusive flap seal poses a maintenance problem. Every time an elevator is taken off for service, the flap and seal must be removed too. And with ordinary flap seals, that's a long, costly job.

So Lockheed engineers came to B. F. Goodrich with the problem. And B. F. Goodrich had the answer—the Pressure Sealing Zipper.

The zipper's overlapping rubber lips provide a 100% airtight seal against pressure. At a crack, the elevator controls are easier to operate. When an elevator is removed, mechanics simply unzip the seal instead of laboriously taking out one piece after another. If a new elevator is installed, old and new halves of the zipper mesh perfectly, since all halves of the zipper are interchangeable. And the zipper makes it easier to get a tight fitting seal around the body slotted over the main arm in the plane.

B. F. Goodrich Pressure Sealing

Zipper can be extended over entire fabric or metal. They save space and weight. For slightly curved complex shapes, use over an airplane door, air duct, innermost covers, wingtip protective coverings. For information on construction and applications of Pressure Sealing Zipper, write for our new booklet, *Hold Everything! The B. F. Goodrich Company, Aeronautical Division Akron Ohio*.

B.F. Goodrich
FIRST IN RUNNER



IN THE NEWS

G-E FLIGHT TEST CENTER FINDS ANSWERS IN THE SKY

A new way to test turbine equipment is in the air. The General Electric has contributed its several laboratory that stretches eight miles up into the sky.

At the bottom of this job is the G-E Flight Test Center at the "Schwartz," N.Y. County Airport. Here, a "private air base" is put through its paces with new and improved aircraft equipment. A division of the Company's General Engineering Laboratory, the Flight Test Center is devoted entirely to testing General Electric turbine equipment in the air.

G-E's program of designing, testing, redesigning, creating means better, more reliable equipment for you.

One of the biggest current programs is an accelerated service test of G-E 347 engines in a North American B-45C, for the Air Force. This B-45 is one of the newest planes to join the Flight Test fleet.



Ed Haven, left, new manager of G-E's Aviation Division, beside G-E's first airplane, built in 1930. Prior to this purchase, equipment was tested in a monoplane rented for a dollar a month. Paraglider of new like Haven made possible the extensive facilities now in use.



New engines and components are tested thoroughly while aloft from the bomb bay of a B-29. Here a J47-GE-23, powerful new jet recently placed in production, is made ready for its flight test bed. New engine control, anti-icing, and ignition systems were first proved and improved in this plane.



A B-29 is pushed along by a standard J47, specially constructed for test work. Many engine features and pilot techniques first checked out here, are now being installed

proved in General American Airlines crews, under contract to G-E, perform all flight operations.



Long distance wires and radio-telephone keep engineers in G-E's Aircraft Gas Turbine Division in Lynn, Mass., in contact with the crew in the test plane. Walter Goss, of the Test Center, talks to Lynn (200 miles east) with the plane in his left hand, and the B-29 (eight miles up) with the plane in his right hand.



Special instrument panels in test aircraft are photographed four times per second. Cameras and instrument panels were specially designed for this purpose. After each flight the films are studied minutely to gain all possible information on operation of the engines.



Many types of aircraft are used. This B-23 tested high-altitude turbo-propellers during the war. Cohen, presiding from behind, described on this plane, is now in use on many military craft as well as on some commercial transports.



One of many projects at the Center has been a jet powerplant for a development helicopter. A 150-hp unit served as a test pit for "Oquirrhoe Skyhook." Forest, pilot, and turbine engines are tested here.



The G-E stable of planes includes many loaned by the government as well as Company-owned craft. Closely guarded, the Flight Test Center tests aircraft, instru-

ments, equipment, radio, electronics and communications equipment, electrical systems, and other aircraft equipment, in addition to aircraft powerplants.

GENERAL ELECTRIC

10028



PIONEER AIR LINES FLIES DEPENDABLY WITH TEXACO



TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

PIONEER AIR LINES: One of the Pioneer DC-6's, the latest four-engine plane with a month since its inauguration, Pioneer has flown more than 45,000 persons more 150 million passenger miles, in addition to handling large volumes of air mail, in excess of six billion. Engines of all Pioneer planes are lubricated exclusively with Texaco Aircraft Engine Oil—A big reason, they believe, for keeping our skies on schedule and our passengers cozy too.

Operating over 1,875 route miles, Pioneer Air Lines links 22 cities in Texas and New Mexico with fast, dependable service. Obviously, dependable engine performance is a "must" — and Pioneer meets it with Texaco. Engines of Pioneer's entire fleet are lubricated with Texaco Aircraft Engine Oil exclusively.

But it's not alone the high quality of Texaco Aircraft Engine Oil that assures Pioneer performance and operating economy. Texaco Laboratories Engineering Service is a big help in operation and maintenance crews—one of the major reasons why —

For more than 15 years, more revenue airline miles in the U. S. have been flown with Texaco Aircraft Engine Oil than with any other brand.

Let a Texaco Aviation Representative give you all the details and show you the benefits you can gain with Texaco. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texaco Company, Aviation Division, 135 East 42nd St., New York 17, N.Y.

NEWS DIGEST

DOMESTIC

Rescue DC-60 being lifted at Wright-Patterson AFB suffered engine damage when it belly landed after a recent test flight in Dayton. The landing gear is believed to have failed on touch-down. Further evaluation will depend on whether replacement parts, particularly new tires, can be obtained.

New atomic shielding materials have been developed at Oak Ridge, Tenn., laboratories, which should aid in development of atom-powered aircraft. A release from the laboratories revealed that work on two programs on shielding phenomena and materials has shown definite progress.

Mil. Charles E. Yeager, USAF, first man to fly faster than sound, has been named "captain of the year" and winner of the General "Hap" Arnold Memorial Trophy by 118 air cadets from 14 countries, now in the country under international cadet exchange of the Civil Air Task.

Personnel and executive plane reports for July of planes of 6,000 35 and less, engine estimate might total 74 valued at \$294,028 by some companies. From one month 15 planes worth \$239,201 were exported.

Temporary defense industry bottle neck has been caused by failure of NSA to allocate clearance agent for ratings in September and part of October.

Three top USAF generals get new assignments. Maj. Gen. Francis L. A. LeMay, Jr. becomes assistant chief of staff, communications, Allied Air Forces Central Europe. He was previously Director of Communications, Deputy Chief of Staff, Operations, in Washington, D. C. Maj. General Raymond C. Mabe, commanding general of the 100th Special Weapons Sqdn., Washington, D. C., will take Gen. A. LeMay's former post. Brig. Gen. Donald J. Kozel, director of research, Air Research and Development Command, Baltimore, Md., takes command of the 109th.

EWING's maintenance base in Kansas City, Kan., had by last month's flood, will be back to normal by the end of this week, when the first Conquest will be far overhead. Flooded offices were almost resealed, will not be in operation until the end of next month.

First modified Convair T-29 appears

Intercontinental bomber (military Convair) has been delivered to the USAF. Changes include increase of gross weight from 49,500 to 49,575 lb., order wing fuel tankage capacity increased to 1,500 gal., and installation of new main landing gear.

Gen. Carl A. Spaatz Airport is now under the Bureau of Municipal Airport, Reading, Pa., dedicated Aug. 12.

FINANCIAL

United Aircraft Corp. reports net income of \$9,977,997 for the first six months of 1951 after federal income taxes. This compares with a net of \$6,032,116 for the same period last year. The corporate net, after total corporate, orders and letters of intent at June 30 was about \$1,185 million for its second division.

Mil-Conflight Airlines turned in a net profit of \$215,000 in the first half of this year, after taxes, compared to \$154,184 last year in the same period. It reported net loss of \$46,034 in its local service wing, after slowest for tax service attributable to the loss, in total MCA's net profit to \$253,770. Operating revenue in the first half was \$4,630,661.

Sperry Corp. directors have declared a quarterly dividend of 50 cents per share, payable Sept. 24 to stockholders of record on Sept. 7.

INTERNATIONAL

Three Douglas DC-68s—including 38—have been ordered by Canada Pacific Lines for delivery late in 1952. CPL will become 32nd operator of DC-6s.

British Overseas Airways has recognized the flying success of the first service using two Relco-Bosch Dual powerplant Douglas C-47 Dubois, making four round trips weekly between London and Humber, Germany. The flight ran to give B.O.A. a new experience with the Dubois, which is on trial in the Vietnam Vietnam line has ordered.

Prime Minister Attlee is scheduled to open the International Air Transport Ass'n's annual general meeting in London Sept. 10.

IAEA Closing House, London, has received \$75,231,000 in transactions during the last half of the year for international flights, more than \$3 million last year (see special report page 10).

Glideslope Receiver TYPE R99M

C.A.A. Approved

Designed for 3 or 4 channel operation, the Avionic Associates Approved Type R99M is intended as a replacement for, and is interchangeable with, the modified 4870. It is mounted on standard military Glideslope A boxes.

They have small components. Reduction in power consuming and other components are in accordance with Avionic Associates' Committee for Avionic specifications. Standard battery range: 120-230 ft. Weight: 12 lb. x 4 in.



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Specify alternate operation desired (3 or 4 channels) when ordering \$250.00



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frequency 2° dial scale—1 degree
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Photographed details a golf ball in close size and compact design

The Rotorette approaches the ultimate in simplicity for a non-potential rotary actuator. Located at the source of the rotating force.

Motion is controlled positively by adjustable mechanical limit stops. The adjustable load-sensitive limit switches are de-energized whenever the contact action involves the loss of mechanical energy or increases the maximum permitted load. This system provides two control characteristics for dependable operation of valves, dampers, etc. up to 10 inch pounds maximum operating load.

See enclosed literature for 1951 I.A.S. Antennacal Engineering Catalog or write for Bulletin 118.

ROTORette

is currently used on these planes:



1. Automatic porting of the drive device
2. Elimination of damage from overtravel or overload

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SIDELIGHTS

Industry

► **Mr. Guy Gordon F. Smith (USAF)**, but I will assume a contact to General Smith. Values for about three months and then it stood to join the staff of Republic Aviation Corp.

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Transport

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Civil Aviation

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Aug. 25 for flying between Aug. 25 and 26. From there it goes to Kansas City, Wichita and Los Angeles. It has already flown 4,100 miles and 147 pilots have used it.

Procurement

► **Small business** looking for defense contracts will get a first look at products needed by great contractors in the exhibit at Atlanta's Steel Business Sept. 10-13.

Services

► **Washington** Executive Services have been exhibited by Richard N. Gould at 1000 Connecticut Ave. in other other day-to-day or emergency business services in industry. Gould was formerly on public relations staff of Gates Wright and by Lee and is an entrepreneur in the capital.

WHO'S WHERE

In the Front Office

► **J. F. O'Neil** has been named new president of the First Western division of Boeing Co., succeeding E. C. Murphree, who resigned effective Aug. 31, after 414 years of service with the company. O'Neil joined the firm at Fort Wayne in 1946, previously was a management consultant.

Changes

► **John H. Swartz** has been promoted to chief engineer of Boeing, Inc., Portland, Ore.

► **Charles E. Frick** has been designated chief sales engineer for the division of Boeing Aircraft Co., Portland, Ore.

► **G. J. (Dick) Jones** has been named assistant division manager and chief engineer of the Boeing Aircraft Co., Portland, Ore.

► **Arthur F. Jones**, formerly head of the production branch of NACA's Langley Laboratory, has been named professor of aerodynamics at the Polytechnic Institute, Brooklyn, N. Y.

► **Herbert C. Brown** has been appointed director of research for Pacific Aeronautics Corp., Berkeley, Calif.

► **Harold R. Ralston** and Paul F. Young have been promoted to assistant regional managers of Tecon Engineering & Mfg. Corp., Dallas and F. G. Stettin has been designated assistant superintendent of commercial production. Reed Dwyer has been named superintendent in charge of production at Lancaster Airplane Corp.

On the Board

► **Robert E. Cade**, last been elected to the board of directors of California Eastern Air Lines. He continues to use president at West Coast operations for the same organization.

► **Weekly** picture page appears on p. 76.

INDUSTRY OBSERVER

► **Electronics** begin in the complicated movement system of the Boeing project B-47 bomber are causing trouble. But Electronic Electric and General Electric engineers are about to exterminate the bugs, Pentagon sources say. At latest report successful protective campaign of the machine jet bomber was still incomplete due to difficulties which have been encountered in tests undertaken with the fire control system mechanism.

► **Jet fuel** for the Red Air Force in Germany is being produced at V. E. K. facilities near Leipzig. It is designated DLR. Also at Berlin and at nearby Zossen, but for intercepting aircraft, designated HLR, is being produced.

► **Air Force** 1952 fiscal year estimates call for expenditure of \$879.4 million for ground handling equipment for airplanes, including \$72 million for loading equipment, \$64.3 million for lighter equipment, and \$38.4 million for transport equipment.

► **Three** groups of Russian MiG-15 interceptors have been assigned to the East German air fields at Guters and Pommern to defend the Red missile routes at Pommern. Meanwhile in the Soviet Union, the MiG-15 interceptors are being used to intercept the German jet bombers (MiG-15) and the MiG-15 is being used to intercept the German jet bombers.

► **Personnel** to power 500 American-built F-46 Sabre fighters with British Rolls-Royce Avon engines, at a cost of replacing the RAF system with a quantity of high-speed jet interceptors, is still for those dead Soviet personnel sources say that if the engines could be replaced as fast as the aircraft, the problem would be nearly solved. With spare, according to U. S. tables of supply, it would mean four or five engines for each single-engine fighter.

► **Five** for the first four Boeing B-52 airplanes, reported by Air Force spokesman to \$23.5 million a plane includes \$10 million looking for the second \$12.5 million to the plane. There are still some indications that the first four will be all that will be produced at Seattle, or at least that any quantity of B-52 production will be necessary to the Air Force in Alaska, Cal. On the basis of production of 180 units at rates of the aircraft bomber, Air Force expects cost would be about \$15 million apiece.

► **USAF** is interested in the heavy load, para-ascending because the method can be used to produce in single large planes, components formerly assembled from several parts. At the new Wiesbaden-Gesellschaft factory plant at North Guernsey, Mass., an 80,000 sq ft aircraft assembly building over four German aircraft hauled out on a single container a complete bomber can stand column for a General B-56 bomber. The estimated cost of the plant is the old-fashioned conventional personnel method.

► **Boeing** Aircraft's two-engine C-47 light transport of World War II is getting a new lease on life in 1952 USAF budget estimates. They will be modified and modernization of 913 of the C-47s at a total cost of \$11 million or about \$14,000 each. Also on the list for a "rebirth" are 175 of the old-time, new pattern North American T-38 trainers, which will be re-equipped at a cost of \$5,000 per plane.

► **Air Force** plans to do 15,700 engine overhaul in its own shops, and contract for \$1,500 on each engine, totaling a total of \$24,000, at a cost of \$11.4 million. In addition the cost to the Air Force. Air Force collected costs of three of the engines currently on hand engines in \$54,000 for the B-460-41 used in the B-36; \$24,000 for the B-370-47 used in the B-29, and \$16,000 for the B-1620.

YOU CAN BE **SURE**... IF IT'S
Westinghouse



These leading U. S. Air Force **PENETRATORS**
are **POWERED** by Westinghouse

Being penetrators, these planes must carry out tactical missions deep into enemy territory. To provide the required fuel economy and dependability, Westinghouse J-34 turbines have been chosen for their power plants.

Westinghouse is constantly striving for improvement in jet propulsion... to provide only the best for the United States armed forces, it is privileged to serve.

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AVIATION
GAS TURBINES



AVIATION WEEK

VOL. 35, NO. 9

AUGUST 27, 1951



BENJIE TROPHIE WINNER Col. Keith K. Compton, USAF, receives commemorative from Major F. Thompson, Bendix Aviation president, for being 1949's ace at 551.6 mph in F-86A.



THOMPSON TROPHIE WINNER Col. Fred J. Jensen, USAF, and friend award prize from Fred Cleveland, president of Thompson Products, Aeronut 300 for 300 km. (186.4 mph) in F-86B.

Races Prove Crowd-Appeal of Air Power

Services' static exhibits and flight displays
push attendance above 200,000 mark.

By Ben S. Lee

DETROIT—One of the most complete public displays of this nation's air power yet shown was a top drawing card at the 29th annual National Air Races at Detroit Aug. 15-19.

A record two-out of seven than 200,000 people jammed highways leading to Detroit's Wayne Major Airport, and poured beyond all doubt—much to the surprise of the industry—that the nation had a definite interest in seeing just how well and for what its air defense tax dollars were being spent. Foreign interest was indicated by presence of 17 air attaches of other nations.

Although several of all these aircraft flew in demonstrations and appeared on static display, Air Force was the chief exhibitor of the air clinic mounted after a two-year lull.

■ **Air Force**—Air Force apparently was not so concerned in getting its dollars in air power service across to the public as the public was in learning it. USAF displayed none of its assets might that it ever had before, including most of its latest fighters, bombers and transports, with, for the first time, complete armament.

The public was allowed to walk through some of the latest bombers and transports, to examine cockpits, controls and some details of armament and radar.

■ **Race**—The races are three world's records set and for the first time, all four participants in the major events on the program.

■ **Air Force Col. Fred J. Jensen**, 34, flying a North American F-86B, broke several American and world speed records for the 300 km. (186 mi.) Thompson Trophy closed course race with an average speed of 551.611 mph. The race record was set during speed trials the day before the main activity got under way. The trial race was won by USAF officials and was presented to stand when Jensen's later Air Race performance averaged only 528.698 mph. Both marks topped the previous record held by John Douglas Derry of Great Britain. Derry's mark of 505.330 was made Apr. 12, 1948, in a de Havilland 163 scratch plane.

■ **Bombing**—Participation—Naval and Marine flight activity was restricted to light demonstrations by reserve personnel. The late Admiral Forrest Sherman had asked out major participation by the Navy in this year's National Air Races to eliminate any possible competition between the services. But Naval officials attending the meet decided that competition would be a healthy thing and next year the policy will probably be reversed.

Average speeds of an aircraft equipped and demonstrated various helicopter and fixed wing variants. It showed how aircraft are now adapted, performed new landing, sustained, maintenance of wounded, wrong effect things.

All four major races—The Bendix, Thompson, Alcock and General Electric—featured only USAF jet fighters and bombers. Most static displays were provided by the Air Force, although there were some Navy exhibits on display, including the giant Lockheed Constellation and a Chance Vought twin jet F-100 fighter.

■ **Bendix Trophy Race**—Highlighting the first race day was the arrival of the Bendix Trophy Race participants from Mexico to Detroit. Competition were two North American F-86B, Sabers, three Republic F-84E Thunderbolts and two North American B-45C four-engine light bombers.

Winner of the \$75,000 competition was Col. Keith K. Compton, who set a new record of 551.761 mph, as he F-86A finished 1 hr. 28 min. 36 sec. flight from Mexico to Detroit. Compton made the 1916.6 km. flight with

two five-minute touch-downs at Detroit and Omaha for refueling.

Compton's share in the Bendix class would have been \$15,000, but with military regulations forbidding cash awards to military personnel the prize \$15,000 prize will be turned over to various military relief organizations.

Second place winner in the Bendix was Col. Kenneth S. Dora who piloted an F-84F at an average speed of 554.947 mph. Third place to cross the finish line was a North American B-45C light bomber piloted by Lt. Col. George Thibault who made the transcontinental flight in 3 hr. 35 min.

Other pilots in the Bendix, in order of time arrived at Detroit, were: Capt. Bernard White (B-45, 3 hr. 35 min.), Capt. Edward R. Johnson (F-84, 3 hr. 39 min.), Maj. Gilbert A. Polmers (F-84, 3 hr. 46 min.).

Capt. Thomas W. Gibson, piloting a North American F-86 crashed the Detroit field at altitude and left down on the Selfridge AFB, Mich. Because of this ground crew had to supply Gibson fuel to land at the air base and was disappointed. All of the Bendix participants figured that this comes very closely during the race. Compton, for example, had less than 25 gal. when he touched down at Detroit.

After the race, Compton said that most of his transcontinental flight had been made at about 45,000 ft., and that during the Indiana turn Chicago to Detroit he had "blown a little better than 700 mph."

Speaking of his F-86 performance, Compton said, "It handled very well although the flight was a little turbulent. When the plane approached the speed of sound it had a tendency to 'vib' up."

Previous record for the same race was at Cleveland in 1948 was 519.634 mph. It was held by Maj. Vernon Fort. • **Albion Trophy Race—Four Republic F-84E Thunderbolts** competed in the 500 mi. Indianapolis-Detroit dash which

let Lt. William D. Busley was with an average speed of 550.517 mph. Second place went to Col. William E. Bertram, and third to Lt. Col. Jacob Kurtz.

While no scores appeared across this year's race, Lt. Col. John W. Lufkin, competing in the Albion class, clocked his F-84 on Detroit with a "time out" of the airport just as the field was leaving airborne. Lufkin, native of Austin, Tex., equipped with a towed lance and a scorching heat, and that his plane was at approximately 145 mph when the airport cleared.

• **Continental Trophy Race—Midget racing plane** event for civilian craft and which was won by John Paul Jones of Van Nuys, Calif., with a record-breaking speed of 397.225 mph. The race was restricted to aircraft with an average displacement of less than 190 cc.

• **State Exhibit—Many of the aircraft on static display were armed with dummy rockets and bombs shown publicly for the first time.**

New shows, Lockheed F-2V Nop nose, Grumman F1F Bonnet, Lockheed Convair, Martin AM-1 Mauler, Chance Vought XF7U Canine and a test display of automatic including machine, machine gun, machine, and aircraft electronic devices and color equipment.

An Air Force static exhibit, included the Convair B-34, North American B-45, Douglas C-119, Fairchild NC-130, Republic F-84E, Boeing B-50 and anti-aircraft equipment and aircraft. In addition there was a static exhibit B-36 that received considerable attention.

• **High Performance—Flight demonstration of the Boeing B-47 swept thrust was made on both days and each included a parachute-ejected back seat. The planes were ordered on both days by Col. Paul Tibbets, pilot of the Nagasaki atom bomb B-29, of World War II fame.**

New conducted a comparative dash demonstration between an F1F propeller-driven fighter and a McDonnell F2H-1 Banshee jet fighter. The F1F, holder of the world's record for 30,000 ft. in less than a minute, shot (less than one minute) flew up to its record. The Banshee, after it got off, flew close to the ground until it gained speed and then caught up with and passed the Bonnet somewhere above 30,000 ft. The Banshee climbed right on up to about 45,000 ft. before leveling off.

Considerable interest was shown in an Air Force demonstration showing utilization of the Chase YC-112 as a glider towed into a "battle area" by a Fairchild C-119. The YC-112 was then cut loose from the mother plane, out in its region, landed and delivered two pups, two drivers and two machine guns. These latter started blasting at "enemy troops" with machine guns as the pup slid out of the C-112. Immediately afterward, the plane's emergency egress system dumped and the plane soared off the ground after a 400-ft. run with a two-battle race action. The whole ground operation, from touch-down to liftoff lasted 35 sec.

State officials were given considerable more prominence in this year's National Air Races than previously, and proved extremely popular with the average spectator. They actually gave the standards an opportunity to display his wares to the man who ultimately pays the bill.

With the presence of major New participation in next year's show, jet aircraft makers will probably prove to be an ever greater drawing card. This year, before, particularly with the delivery of more types of fighter and bomber planes to the services. Easy helicopters and both services will undoubtedly be shown in well the huge Convair X-4B and Boeing B-52 receiving jet thrust.



HELICOPTER—Medium high speed, surprisingly low speed of 50 mph, and . . .



SIMPLE INTERIOR for four passengers.

Four-Place Helicopter Shown at Races

Unheralded debut view for lightplane interest with midget races.

By Alexander McFarley

Detroit—A four-seat sport on the 1951 National Air Races would be:

- Speed, plus
- Aerobically performance, plus
- Static show, plus
- Spectacular, obviously, plus
- Slipping, obviously temporary and maximum cost.

Then, in this spirit, you can add one factor which in your race more may be all that the old gaffes of aviation will remember about the 1951 races. It is not the year when they first introduced the four-place slow flying helicopter, an aircraft that past might remember even as transportation.

The team, and helicopter Center, making its debut at Wayne County Airport is a team preview without adverse publicity nor considerable military and civilian aviation attention as it circled through the air at an average 30 mph and then stopped up to 150 mph. Its success in future events now on.

• **Materials** Whether its development can get through the formidable materials system which is shaking a number of producing aviation ideas.

• **Liability** Whether Army aviation and Air Force procurement can get together on a proposal to order a future version.

• **High-Lift Design**—The helicopter Center has a 360-hp Lycoming GO-315 engine with reduction gear turning as automatic, possibly, but the concept of its performance is in its high-lift wing design, incorporated in the design.

by Prof. Otto Koppen of Massachusetts Institute of Technology. He developed the plane to performance specifications laid down by Dr. Lyda Zellinger (now on leave from the faculty of Harvard Business School) to serve as prototype of Helio Aircraft Corp.'s. The light-lift device includes helicopter-type and landing aids, etc.

The production prototype attains approximately the same slow flying performance in the two-place No. 1 helio plane, but has been redesigned to permit use of a readily available engine

and propeller combination and to meet some anticipated industrial and military requirements. Dr. Zellinger told Alexander Wray, that he expects to test his one-lifted against several Detroit within the next few weeks, with a view to producing some custom-built models for the armed services and possibly for a few business plane customers before trying a larger production program.

The plane can be adapted to carry six persons at some condition of the air, and slow flight performance which makes it possible for it to operate from

National Air Race Results

Bendix Trophy Jet Race

(Pittsburgh AFB, Meigs, Calif. to Detroit 1919.6 mi.)

Pilot	Plane	Speed mph
Col. E. K. Compton	F-84E	511.751
Col. F. E. Dora	F-84E	510.847
Lt. Col. G. E. Tibbets	B-47	512.037

Albion Trophy Jet Race

(Detroit to Indianapolis to Detroit) (Detroit to Indianapolis to Detroit)

Pilot	Plane	Speed mph
Lt. Col. W. D. Busley	F-84E	560.712
Lt. Col. W. E. Bertram	F-84E	572.395
Lt. Col. Kurtz	F-84E	521.825

Thompson Trophy Jet Race

(100 kilometer (62.14 mi.) closed course)

Pilot	Plane	Speed mph
Col. Fred J. Auman	F-84E	615.026

Chicago-Detroit Jet Speed Run

(Note: Same pilot and plane as record world closed course 100 km. record of 615.411 mph. Aug. 1977)

Pilot	Plane	Speed mph
Capt. Dora J. Bertram	F-84E	672.180

Continental Motors Trophy

(50 lap midget plane, 500 ft. laps of 21 mi. six piston engine)

Pilot	Plane	Speed mph
John Paul Jones	Boeing	397.225
Steve White	Boeing	392.174
Keith Norris	Boeing	387.476

National Parachute Jumping

(Closed Course)

Pilot	Plane	Speed mph
Robert L. Nelson, Gene Jackson, Eugene Van der Grinten, G. A. Wickert, Pat Lee, Van der Grinten		



CONSOLIDATED VALIANT GRASSHOPPER FREIGHTER

A highlight of Army Field Forces' display at the 1951 National Air Races was demonstration of how Convair B-13 could supply

isolated valleys with needed supplies. First supply plane is used to release food stored in wing struts and cargo in cabin to second

one. Plane's ability to fly at low speeds makes it particularly suited for the type relief job.

Among 1951 Continental Trophy Entries



No. 27 ("N. Bop"), pilot, Bob Pfeiffer



The winner—No. 16 ("Shooting"), pilot, John F. Jones



No. 46, pilot, Joe Marquis



No. 25, pilot, Dick Olson



No. 8 ("El Monster"), pilot, Bill Bermond



No. 74 ("M. D."), pilot, Hank Osterfeld



No. 9 ("Mamm"), pilot, Rip Macy



No. 17, pilot, Bob Beckington

ting in town or plant side leading area, about football field size, with several kids.

Formation of the experimental Circus of Darius showed it has the practical before-and-after and eight-door combustion arrangement used by Piper on the Clipper and Piper Cubes appear money and well-equipped with excellent visibility. Metal wing and tail surfaces and metal forward fuselage section are joined by a fabric-covered rear fuselage section at welded taking.

Continental Kees—Last segment of the professional pilot's major longer sports for each, the major plane was sponsored by Continental Motors Corp., was another advance in speed this year. The fastest of the 50 hp motor was a new aircraft of 170 mph and the plane was "Shooting" piloted by John Paul Jones, Van Ness, Calif., pilot who also won the 1950 Continental Trophy at Detroit's International Air Fair.

Vietnam school teacher-pilot Sgt. Victor (Steve) Wootton, of Oakbrook, Wis., got his "Bee" moved up to 192 mph to take second place ahead of Earl Stinson, La Crosseville, Calif., who had 187 mph for the third place time.

In qualification, Jones had just crossed the 500 mph mark by a fraction, taking the job, position with a 193 778 mph top speed.

Most unconventional major plane in the race, the Fox Speed from St. Louis, which was a patcher propeller and a single-wheel landing gear, finished with a consolation event, after lifting to gain qualification for the final.

Speed Advances—Indicators of how much have advanced the first major trophy race conducted at Cleveland under General sponsorship in 1947 are these figures:

- 1947—Bill Bermond won with 157-187 mph.
- 1948—H. R. Solman won with 169-168 mph.
- 1949—Bermond won again with 177-154 mph.

The continental race size naturally caused from a sports viewpoint because of the great distance between the operators and the racing planes. The seven appeared little bigger than in more modest from the closed boxes and could hardly be seen at all from bleachers with the naked eye.

Acrobatics—Previous rule statistics by the rule prohibited "wild maneuvers," heavily frowned by the crowd, and national champion, Bud Jovine, and by the women's champion, Cora Bleyer, provided the fastest as the aerialists came to many of the spectators.

Millions of fans have seen by an RCAF team at Vespers, and by a USAF team of "Acrobats" in Luck

Faster Write-Offs Of Planes Sought

Seven airlines have asked for Defense Production Administration permission to permit accelerated destruction of over 500 million of surplus equipment. But within the two weeks, which moved a year ago, when the going was easy, the airlines have moved too late to take full advantage of the far-reaching permission for defense equipment.

American Airlines and Trans World Airlines' applications are the first case up for Defense Production Administration decision at Dept. of Woodard's Division of Defense Regulation of the American Airline Association's application on five new General Motors TWA asked for speed up write-off as 70 planes including Martin 4-4-4s and Constellation, but the Commerce Department is planning for only 25 of those TWA planes at DPA, now Commerce is holding out the offer five airlines' applications for results of the American TWA test case.

Unconscionable. Restricted with DPA officials last week to present more detail on the case of the airlines asking accelerated destruction.

Result is that last week chances of establishing a precedent allowing airlines to make accelerated write-off on some planes appeared "impossibly remote."

- Agencies Against—Here are some agencies given against permitting any airline to accelerate write-off an aircraft, according to Don L. Gensell, Woodard's assistant at the DPA division.
- Alphabets don't carry much weight unless compared to railroads, especially excellent steel and new aircraft.
- Airlines' equipment already has such rapid amortization, its write-off that a certificate permitting five-year actual or seven-year write-off is not reported.

Commerce' American's application would set a precedent, DPA wants to be careful about establishing any new precedents.

Now Defense Minister Charles E. Wilson has told DPA a new direction declaring a 60-day moratorium on issuing certificates. The Wilson directive tightens the standards by which DPA is to judge which capital equipment may enter accelerated amortization and how accelerated. Last week DPA administrator Morley Fleishman was working on an interpretation of the Wilson policy directive, and said the new policies are interpreted at DPA, there will be no decision on whether airlines will rate anything under these.

Merger Move Seen For NAA, NAC

Merger of two major national aviation organizations, National Aeronautic Association, and National Air Council will probably take place soon.

The merger movement began at NAA's annual convention, in Detroit, which authorized a committee to negotiate with a similar NAC committee on young forces. The NAC committee is Dr. John Victory, chairman, William McCracken, GE, Ralph Wilson, Harry Cullen, and Col. Bruce F. Foster. NAC's committee will be named shortly. The two committees expect to meet early in September.

The NAA delegates stipulated, however, that NAA is to retain its identity.

Donald D. Webster, Washington aerospace executive, was elected president of Webster is now president of the Air Club of Washington and commander of the National Civil Wing of Civil Air Patrol. Other officers named were Roger W. Kuba, vice president, for PAL activities; Dr. Cos. J. C. Etkin, vice president, for technical activities; Edward G. Swenson, vice president, for air youth; Adm. Emory S. Lord, vice president, for air transport; John Curry, vice president, for racing; and Mrs. May E. Brown, secretary.

Lawrence G. Lerman, past president, will continue to serve as NAA director.

craft, the reason for which cannot be determined."

Pilots say the two B-2600 engines operated normally at 45 inches of mercury and 2750 rpm on takeoff from the 8,500-ft runway with one spin wind. Yet air speed increased slowly. At speed between 90 and 100 mph, and just before reaching runway's end, pilot pulled the plane up with both pistons on the control column. After takeoff the highest speed he got was 100-105 mph. He climbed to 180 feet, with the plane shadowing aircraft. Then the plane began to sink. It struck an obstruction light on top of a 48-ft electric light pole (310 ft south of runway's end). Plane hit three more poles as it settled in. Plane was washed out, but no one was hurt.

► **Fracking-CAD** finds that under varying weight, wind and pressure conditions, the plane should have reached 90 ft and air speed of 123 mph (5,100 ft. from takeoff start). This particular plane was reported consistently slower in acceleration and takeoff than others of the same type; the pilot used a 5,500-ft runway under virtually no-wind conditions, when he could have posted an 8,500-ft. one. Take-off was in tailwind attitude at almost the very end of the runway, in a cloud of 180 ft. a partial stall developed.

Three weeks after the C-46 accident, another C-46 flight experienced similar trouble taking off from the same run way, but got back safely.

In the report, the Board concludes: "As a result of this (C-46 crash) and

other experiences with the C-46, which indicated certain deficiencies in the inherent performance of this model aircraft, the (CAA and CAA) undertook a ground study of this problem."

The Board has proposed appropriate amendment of the Civil Air Regulations to adjust downward mean sea level take-off weights.

Carrier Clears Deck With Hinged Stacks

The biggest aircraft carrier yet, the Navy's new *James V. Forrestal*, will go back to the old-time carrier design for the principle of hinging stacks to give a greater, clear deck area. Plans for the new *Forrestal* call for the stacks to be hinged and fold outward as they do on the old *Forrestal*.

This feature, combined with the 12 complete island of the upper decktop will give a clear area 1,049 ft long and 257 ft wide. [This compares with an overall length of 568 ft and a beam of 118 ft for the *Niagara* class CVN convert, largest now in service.]

Navy's contract for the *Forrestal* with the Newport News Shipbuilding & Drydock Co., of Newport News, Va., is expected to run to about \$215 million. The carrier is to be completed some 35 months after construction starts.

Standard displacement of the new carrier is 59,900 tons as compared to 45,600 tons for the *Niagara* class.

Displacement with full load is expected to top 70,000 tons as compared to approximately 60,000 tons for the *Niagara* class.

► **As One Ship—**Arrangement of the retractable-island principle indicates that the Naval aviation has their way as to experiment with the Navy Bureau of Ships over whether the island should be retractable or not.

A Navy spokesman has denied reports that a second carrier carrier has already been approved by the Joint Chiefs of Staff. However, high Navy sources are convinced that additional big carriers will soon follow.

Australian Canberra Bomber 'Years Off'

(McGraw-Hill World News)

Melbourne—Although looking for Australia's production of the Canberra bomber was supposed to have started some time a year ago, no responsible officer of the Government Aircraft Factory at Melbourne's Bend will set out an estimated date on completion of the first bomber. At present they will not commit themselves further than that it is "years off," according to one of the leading Australian aviation engineers.

Like other defense production in Australia, the GAF men could not say in their words, "Give us the tools and we will do the job," the magazine comments, adding that the fast tool Australia needs is a real feeling of defense urgency.

But there are physical tool shortages, too. Machine tools, jigs and materials are not rolling in from North America and Britain as quickly as they are required. As a case in point, GAF is not expecting delivery of badly needed Australian stretching presses for at least 18 months though orders were placed some time ago. And there are no Australian presses in Australia capable of making the Canberra's gun houses. These gun houses will have to be fabricated outside presses can be obtained. Delays are also expected in the delivery of production jigs from Britain.

There is no acute shortage of skilled production workers. Pressure on the toolmaking and sheet-metal working staff is expected to be eased somewhat by adoption of the Robinson-Billingham process in latheing. By this method the lathe makes the working drawings with perfect accuracy on a master metal sheet. Again this, says an experienced tool-making expert, by the hydrographic methods. The sheet-metal workers merely follow the engraved lines instead of working from blueprints.

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Drilled flange head screws—carbon plated—steel and (AN24), AN25A; also alloy steel (AN26), alloy steel (AN27)

Washer head screws—carbon plated—alloy steel (AN28)

Corbin steel machine screws—carbon or Phillips recessed—carbon plated (AN29), AN30, AN31, AN32, AN33, AN34

Brass machine screws—drilled or Phillips recessed—plus or carbon (AN35), AN36, AN37, AN38, AN39, AN40, AN41, AN42

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ing a Hamilton Standard prop, the 305 can carry a payload of over 1,000 lb. more than 600 lb. The plane retains Cessna's wide head safety space and loading gear. Initial testing program is now underway at Wichita.

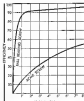


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DESIGNED-TYPE TWO Two shaft assembly



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combined in Table I.)

Some explanation of the items in the chart was necessary. It was explained that advance would refer to the weight of the engine and not including the engine and the Government furnished property. The latter item was considered to include the engine, certain instruments, some of the electronic gear, wheels and tires, landing gear, armament—the only excuse for building a fighter was omitted from the list of GFF, although it belongs there.

Random idea is, of course, the air head, that includes the cost of fuel, light, power, suspension, expendable tools and parts, sleep, food and such. Individual Output—When questioned about individual output, Kunkelberger stated that he did not believe there was much difference between the way people work now and the way they worked then. It was a case of keeping the work as fast as a man at the right time and at the right time.

In explaining the increase in engineering time, Kunkelberger said that it was largely due to the fact that ordinary non-advance design couldn't be used. Highly trained scientists and engineers had to do the new type of work.

And he added that the engineering cost figures included engineering overhead as well. In this case, it was about 80%, which would cover blueprint paper, bookkeeping and travel, among other things.

To point up the amount of drawings needed to produce the F-106, it was stated that every month, the blueprint output could cover the history production floor area of 2,500,000 sq. ft.

Referring to the F-106, Kunkelberger pointed out that the final estimate cost of \$170,100 did not include GFF and about \$77,500 which represented the cost of radar, rocket fire control and navigational equipment being furnished.

Dr. Edwin W. Raveling, Air Force commander, who was sitting in on the session, was asked to help recall NAA's figures with a cost of \$100,000 for an all weather plane. (Apparently such a cost figure had been submitted as a budget request.)

Raveling supplied a flyway cost for an unspecified amount of the F-106D aircraft of \$544,571. This, he stated, was for an operating airplane ready to fight. But program cost, which would include spare parts and special ground handling equipment, was given as \$134,681 (approximately per airplane, and also for an unspecified quantity).

Engineering Increase—Two more charts showed the increasing complexity of the engineering operation for a modern fighter plane (Table II and III). The most interesting thing about these charts is the almost unbelievable increase in work as 100 times or more.

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meeting assemblies. And not only in more actual time involved, but the fastener is more expensive because of the increased quality of the inspection required.

Factory direct labor costs had a clout of their own, which showed these increases from an average order of 50.75 in 1940 to 1940 to a current figure of \$1.75, "with more in the offing."

While on the subject, the matter of fringe benefits and their cost was discussed. Kindelberger stated it understood that he thought fringe benefits were wonderful, but that they had to be counted as elements of cost. "In 1940 we did not have any fringe benefits. We did not have vacation and we did not have any sick leave at that period."

But now, said Kindelberger, NAA has 16-week rest periods, morning and afternoon. These are really 15 men periods, because the power had moved on men chosen these average times of 71 min at either end of the rest periods for getting ready to rest and for getting over resting. This is half an hour per day.

On the best of working 240 days per year, the best rest periods represent three 50-day weeks. Added to this are an paid holiday, two weeks' vacation and one week sick leave. The total seven weeks plus one day for which people are paid and for which they do not work at all.

"I cannot say they are bad, I just say that they are expensive."

Subcontracting—One chart which did not get covered was the record of the committee hearings had to do with subcontracting. And it is too bad that it was not included, because it appears obvious that subcontracting by NAA is sufficient from every angle except cost. Kindelberger said that it costs NAA 22¢ per unit over what it would cost to do it at North American steel plant.

Another chart covered the factory overhead burden. It showed that, among other increases, planning and production control had doubled. "Why?" We are now handling 250,000 sheet orders to the plant with space and everything else, and we are having much better control, which results in lower labor costs. In other words, reliable control increases the burden but reduces the total cost.

Almond was asked if there were any way in which airplanes could be paid down at less cost. "Would there be some way of reducing a management study of your labor utilization and thus with thousands of workers and yet get the same production?" "I think an idea for saving there."

"We were sitting on this side of the table as a Member of Congress, representing the impatient taxpayer who complains that costs are too high

and that waste is prevalent, what would you do in regard to the high cost of aircraft?"

► *Quintable Almond—Almond's answer:* "I would quote the old, 'More production is for a special purpose. You make a uniform. There is no waste in making the quality after you reach a certain point. It would be increased and built."

"However, as airplanes, we have no limit to the quality objective from a performance point of view. We do not know what the boys are going to have to compete with when they go into battle, and we are very apprehensive at all times they will come up against us."

per meter aircraft. . .

"Now, improvement in quality means continuous innovation. That means experiment and experiment means cost and try. It means inspection of steel as well as acceptance and incorporation of these new ideas. That involves laboratory work, calculations and design—much of all kinds. It moves further in such as something would better, it should be incorporated, and we do not wait."

"If we wait, we are asking for trouble when these planes go into competition, and consequently we cannot stop at any point."

► *Lowest Figures—Kindelberger* says

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and if the estimated unit cost could be the minimum cost possible, or would it be possible to reduce this further in production service?

He answered that it was the best possible estimate that could be made. He wanted it known that achieving lower costs is NAA's primary function in life (personally made from building airplanes) and that the methods development group, staffed by industrial engineers, was charged with the responsibility of producing cheaper methods to do things.

Also, he added, though the aviation industry is highly competitive and "cut throat", there is an increasingly large interchange of information on how to do things cheaper.

After more questioning, Kinsdelberg was asked if he felt the aircraft industry was capable of taking on the multi-billion unit for procurement of aircraft. He was reminded that NAA had \$750 million worth of undelivered orders and was asked what about that.

In relating to lead times—the delay between orderplacing and delivery—Kinsdelberg explained that the answer would actually stretch over about a three-year period.

Then the next question was a rewording of the one about backlog. Kinsdelberg was asked if NAA and other aircraft companies would be able to produce the planes currently contemplated in the 1972 program.

His answer was that he saw no real difficulty with airplane production. But we are going to have great trouble with the electronic component, and with all this fire-control equipment, and the gadget workery stuff such as cooling turbines. The engine can still slow, and we are all of these things.

The engine and all of the gadgetry are off in a constant state of flux and improvement. Many of those things will not be needed until tomorrow because it is useful hard to get a true value on thinking and inventing."

Jet Fuel Carbon Probed in Tiny Cell

A tiny combustion chamber, developed to investigate the carbon depositing tendencies at jet fuels, is being used at the Wright Air Development Center, Dayton.

The combustion chamber, a stainless-steel version of a typical combustor for a jet engine, is a hollow cone about 1 in. diameter. It is fed by a preheated jet of air at 4057° (which is the air temperature as it enters a typical jet engine combustion chamber).

Although the primary use to be made of the test apparatus will be the diagnostic micrographs, the end will also be used to test combustion efficiency



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bers like him in all Russia, yet three Communist brain-bolt engineers (the late detachment of the Kremlin over 200 million Russians).

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Right now he's got you in a bad spot. You're afraid of only one thing.

He has your ability to out-produce him. In guns, tanks, planes.

Frankly, he doesn't think you value your own system enough to do it... to make winning the war he has sponsored out of his head.

Just he's wrong!

Remember you and all of us have not yet

built more and better weapons—no do it faster all the time.

We must use every bit of knowledge and creative ability we have to improve our weapons and methods—in time and money and more for every hour we work. Only in this way can we become militarily strong.

But we've got to supply essential civilian

needs as well. We can't allow civilian shortages to add price skyrocketing and lower the value of our dollar.

Then, must we sacrifice for everything, that doing the double job will be the only way to stop Ivan in his tracks—and to save the freedom which our own and which he has never known.

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FOR MORE INFORMATION
THE AMERICAN SYSTEM GOES GOOD

Two New Aircraft for French Navy

Lack of patrol, strike planes may be eased by Breguet types.

Two new naval aircraft are in the offing for the French in the current plans of the Louis Breguet company's new aviation.

The French government has more than been worried by the lack of reconnaissance and strike aircraft attached to the fleet. L'Armée de l'Air Navy will also possess Short Seaer land flying boats and Carrier Helicopters. There is nothing in the Lockheed Neptune or the Douglas Skyraider categories.

But Breguet, with a conversion of its 761 "Deux Ponts" transport and an entirely new tailgun-pole-hubjet two-seater, the Type 96 Voltas, hopes to furnish the French naval air service with a shot in the arm.

► **Deux Ponts**—The French reconnaissance plan of 1953 allotted funds for the production of 15 four-engine reconnaissance aircraft, which it was believed could be developed from the Deux Ponts. Work on this has been deferred, and only now is the first flying test bed for the new series being constructed.

Modifications have been installed in the prototype transport at Breguet's test site at Toulouse-Margat. Daily maintenance has been reduced, including a two-engine turret, two-gun tail turret, a retractable belly radome, bomb bays and wing tip tank tanks.

All guns are 20mm, the tail turret is remotely controlled. The dorsal turret is just aft of the cockpit. Bomb bay is divided into two sections, with the radome mounted between.

French-built engines have been received and may be replaced by Pratt & Whitney R3300-CA-15 engines rated at 2,400 hp each. These engines power the civil production Deux Ponts transport, for Air France.

The first plane's dimensions span 41 ft., 1 in.; length 67 ft. 3 in., height 13 ft., weight empty 55,065 lb. Its cruising speed, 270 mph.

The military type is designated B. 764; the definite order for a production lot has not been given, pending the outcome of flight trials with the new patrol plane.

► **Type 96 Voltas**—The second naval aircraft under development at Breguet is the Voltas, a strike aircraft powered by an Armstrong Siddeley Mamba in the nose, and a Hispano-Suiza Nene in the tail.

The Mamba gets its air from an auxiliary intake with exhaust under the



BREGUET VOLTAS, naval strike aircraft, is powered by turbojet and turbojet.

port wing, the Nene is fed from wing root leading edge intake.

The wing has a Breguet laminar flow section and is thick-topped. It has considerable taper on leading edge, and carries large slotted flaps and dive brakes.

Main landing gear legs retract as wings into the wings, and the nose leg—which has twin wheels—retracts back, wheels.

Hartmann tail has considerable dihedral. Just under the jet exhaust, a tail bumper is mounted.

Seating is for two, side-by-side, upper seats are used.

For work off carriers, the Voltas is expected to cruise on the Mamba alone at speeds between 317 mph and 345 mph. Its armament will consist of

eight rocket plus depth charges or a torpedo, externally along long range. Rocket tanks will be carried at the wingtips.

A second prototype is nearing completion, and it will be powered by the Mamba 3 of increased power. In addition to these Naval versions, there is a land-based close-support version, with a common nose. Designation of this type is B. 961.

Span of the Voltas is 56 ft. 3 in., overall length is 43 ft. 3 in., height is 16 ft. 9 in. Empty weight is 15,500 lb., gross is 22,500 lb.

Max speed with both engines is 550 mph; max. cruise, 240 mph; cruise landing speed, 95 mph. Cruise duration on turbojet alone is 4½ hr.

—Dwight H. Wood



A FEW FLAT-TOP FEATURES

NO BILLS... All four low billows of sight—on wide, flat area giving above tank.

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plant at Nohel is engaged in testing, with a view to improving the aerodynamic and thermodynamic characteristics of the main components of the Osprey jet engine. At the Molten Metal test department, concentration is upon mechanical properties of components and fuel system development. Long-term programs are worked out at Nohel to provide design information for future designs of jet engines.

The Nohel test plant now contains several operating test rigs, including a compressor test stand, variable-increase cascade windtunnel, diffuser test rig, two high-pressure combustion test stands and an atmosphere and alkali combustion test stand. A new turbine test and another compressor test rig are

now coming completion. All test rigs are equipped with, although in the compressor test rig a steam turbine is used to drive the engine compressor under varying conditions to determine its performance characteristics.

The compressor test rig is used to determine such characteristics as flow, pressure and efficiency for various speeds. Instrumentation is sufficiently complete to enable individual stage performance to be determined. Detailed traverses of various sections may be required from time to time to determine the flow pattern of any repetitive test and some Aero Canada engine test beds down by stream is used in the rig, a work more common means of power than having a new turbine

► **Canada Tumbler**—The variable rpm drive cascade wind tunnel is intended to provide basic information for the design of turbines and compressors.

The function of the diffuser test rig is to determine on full-scale models the pressure recovery between the compressor outlet and the combustion chamber inlet.

The high-pressure combustion rig is designed to permit testing of combustion chambers under conditions closely approximating those on the actual engine. The turbine test rig is used to determine turbine characteristics when the turbine is not coupled to the compressor.

The alkali and atmosphere combustion test rig provides means for testing combustion chambers under low pressure conditions. Development tests of atmospheric gas-turbine have a great advantage over pressure tests in that it is easier to lock up time to observe test spots and these conditions. Alkali tests are necessary to perfect the chamber performance of alkali, particularly with reference to blow-out and starting characteristics.

► **Research-Development**—One of the large number of programs being followed simultaneously at Nohel and due to electric power restrictions at certain hours, it is necessary to operate on a 24-hour basis. A staff of about 125 men work at the plant, with a small reserve staff.

The plant and part of the village were built during World War II by the Canadian government and turned to A. V. Roe Canada Ltd. at a book value of \$4 million by the government. Aero executives estimate that between \$500,000 and \$1 million has been spent on extensive new equipment and other development work since the company took over the plant in 1946. Within 15 months test work was being done at the plant, whereas it would have taken about five years to build an entire new full scale jet engine test plant.

Both test plant and Molten Metal plant of A. V. Roe Canada Ltd. are an full military production of the Osprey jet engine and the CF-100 Canada two engine jet fighter powered with the Canada engine.

CF-100 Subcontracts

Subcontract for considerable portions of the CF-100 Canada all-metal jet fighter have been placed by A. V. Roe Canada with Chato Steel Prod. Co. Ltd., Tillery, Ont.

Chato will make rear and rear center fuselage sections, tailplane, radome, fin and tail cones. It is estimated that employment will rise to 500-1,000 workers as a result of the contracts.

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Freedom Ship—Machine gunners keep Communist troops from closing in, as crew members of a hoisted AH-1G convert to an assault from enemy-held shores in Korea by a U.S. Navy Sikorsky helicopter. Flown by all members of the service, this versatile aircraft has demonstrated conclusively that even under the toughest combat conditions, it can perform vital tasks, virtually impossible by any other means.

Now a bigger 16-place Sikorsky helicopter has gone

into action in Korea. This larger type—with its greatly increased capacity, will make even more important contributions to such tasks as supply, evacuation of the wounded or trapped men, liaison, spotting and other essential military missions. To meet demands for more Sikorsky, including a new 4-place model, the Sikorsky Aircraft plant—already the world's largest devoted solely to helicopter manufacture—is being enlarged by a third.

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GUST INTENSITY is measured by moving vanes.

Flight Tests Bring Brabazon Changes

Another milestone in the Brabazon project—launching of a new category of Certificate of Airworthiness for carrying non fare-paying passengers—has just been passed. According to the same former-Bristol Aeroplane Co. Ltd.—this brings the day nearer when it will be possible to operate routinely as well as through service between London and New York.

There have been significant advances in the design of the big Brab during its flight test program, now near the 100-hour mark.

► **Main Balances**—Close indication of progress in the removal of the same balance from rudder and elevator. These were originally installed to reduce the risk of oscillation or flutter.

Just recently, removal of the ballast was completed, after extensive tests on the aircraft and on special test rigs. As a result, the feel of the airplane is considerably improved—making it easier to fly—and there has been a reduction in drag and consequent improvement in performance.

Furthermore, removal of the ballast has meant a weight saving equivalent to three passengers.

Preliminary testing of the pressurizing and de-icing systems has begun. Ultimately, the systems will meet test on 8,000-ft. cabin altitude at a flight pressure altitude of 25,000 ft. In addition, the length of the Brab will increase by 1 in. under full pressure.

Initial flight figures for the system is a differential pressure of 4.1 psi, giving an equivalent cabin altitude of 18,000 ft. at 23,000 ft. flight altitude.

► **Cost**—Aircraft—Substantial progress has been made in the development of gust alleviation equipment. The idea here is that a gust warning device is located on the engine nacelle—on a boom at the same as the wing. When a gust hits the device, producing an angle of attack change on it, the sensor

ENGINEERS' NOTEBOOK



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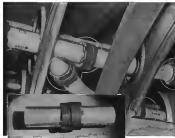
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measures the intensity of the gust. Through linkages and screws, controls are operational to reduce the effect of the missing gust.

On the Robinson, a detector wire protrudes from the fuselage near the pilot's position, which puts the detector about 10 ft. ahead of the wing.

Recent measurements are now being made in flight with the detector wire, and the rest of the mechanism is undergoing bench tests.

The two-armed boom has been removed from the nose of the B-26 to facilitate the installation of a Dzus navigator system. According to one measured by several pilot loads.

Changes for Mr. H. Stetler has released a descriptive brochure which shows, by three-view drawings, what changes are currently anticipated for the M-11 version of the B-26. This later mark is to be powered by coupled Bristol Proteus turboprops, in stead of the current Continental 38 reciprocating engines. The large single wheel landing gear of the M-11 will be supplanted by a 4 wheel bogie we decrease, one to be fitted to the prototype M-11 for testing in a series of touch and go landings.

The gradually curved vertical tail of the giant ship is to give way to a straight trailing-edge layout with larger wider area.

Top board is altered somewhat to allow the Proteus turboprop to discharge at the trailing edge of the wing. The tapered-chord struts of the M-11 are to become cantilevered on the M-11. Elevator area is to be increased and elevator trim tabs slightly altered. A degree of air of dihedral is shown on the M-11 wing.

Door, window and cockpit outlines have been altered for the M-11.

Douglas Skyraider Gets Faster De-Icer

Faster cycling for more efficient ice removal is the feature of a new air-powered pneumatic de-icing system developed by the Douglas AD Skyraider team.

Designed by E. F. Goodrich Co. in collaboration with the Navy's Bureau of Aeronautics and Douglas engineers at El Segundo, Calif., the system is said to be more efficient than any previous device in breaking heavy ice.

It was discovered that by using smaller ice tubes, higher air pressure and a more uniform deflation cycle, ice formations could be broken up more rapidly. So, the expanding air supply tubes were reduced to 14 in. dia. and pressure increased from 7 to 15 psi.

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Chattanooga
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quick and accurate
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It is essential that the pilot of an incoming plane obtain all landing information **QUICKESTLY!** To accomplish this the segmented circle was devised... on easily spotted location from which a pilot obtains all visual information on wind direction and traffic control. It is present practice of CAA to require the wind tee and wind cone to be mounted within the segmented circle. Where the wind tee is of the aperture control type, it will be essentially a traffic control device while the wind cone will show true wind direction.

Experience has shown that when the wind tee and wind cone are both mounted on the ground inside the circle the pilot's view of one is obstructed by the other at certain angles. It is also difficult to tell whether the wind cone and the wind tee are pointing in exactly the same direction. This difficulty is overcome by mounting the wind cone on top of the wind tee. With the wind cone on the wind tee any difference in the directions indicated by the two devices is apparent.

Crouse-Hinds Type WC-18 No. 44593 Wind Cone and Lighting Fixture Assembly can be attached to some types of existing Crouse-Hinds Wind Tee. The support consists of two heavy steel angles which are bolted to the square plate that forms the top of the shaft of the tee.

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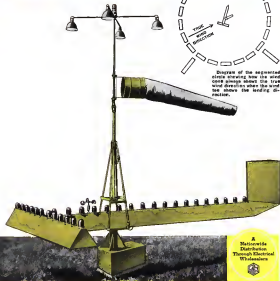
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and WIND TEE



Diagram of the segmented circle showing how the wind cone always shows the true wind direction when the wind tee shows the landing direction.



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Photoangulator Fixes the Slant

The photoangulator—a device to give true horizontal direction from oblique aerial photographs—has passed operational tests at the U. S. Army's Engineer Research and Development Laboratories, Fort Belvoir, Va.

For aerial mapping and surveying, most of the source material comes from photos made with three cameras. These shoot one vertical and two oblique photos simultaneously.

With the photoangulator, a network of representative horizontal control is established.

There are three principal parts to the device—a depression angle assembly,

which adjusts for the depression angle (below the horizon) of the sources of the lines of exposure; a transparent photo area under which control points are introduced; a template arm that lies over the map and indicates the true horizontal direction.

The instrument differs from the current Corps of Engineers angulator and the Air Force stereoscope plotter because it handles a trigonometrical solution. The latter two units produce a geometric solution.

The instrument has been standard and for use to Engineer topographic troops.

high of 5,000 mph. for the sixth engine test.

The tunnel will operate on the six-tonne principle, using a 15-ft diameter circular section. Test section at the facility a 10 ft square.

One end of the nozzle test projects into the balance box, which houses the model and measuring apparatus. Both these sections are fitted with thick glass for observation or schlieren photography of flow phenomena.

When the nozzle test is removed the balance box can be moved forward to give easy access for model change and apparatus adjustment.

The adjustable throat, which follows the balance box, has aluminum plates for roof and floor fixed by screws to give heights ranging from 61-121 in. This gives pressure adjustment inside the balance box and increases efficiency of pressure recovery.



TYPE CONSTRUCTION—Figure A, lead wire in polyethylene AD-500. Available in type 1, 10 or 15 ft; type B, 10 ft. Thermocouple wire available in AD-500 size from 14 to 20 to 24, from 26 to 30.

CONSTRUCTION—Figure B, lead wire with polyethylene insulation, which construction allows it to carry over dimensional loads of more than 100 lbs. Available in AD-500 size from 14 to 20 to 24, from 26 to 30.

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- Seating arrangements for 7, 8 or 9



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NACA Reports

► Preliminary Investigation of a New Type of Supersonic Inlet (TN 2346)—by Andrew Fenn and Louis M. Naam.

The practical use of a high Mach number inlet for supersonic aircraft depends almost entirely on obtaining a very high pressure recovery from the air inlet.

The history of the design of the inlet from having a fixed geometry and in total supersonic compression has led several investigators to believe that better results can be obtained with either variable-geometry inlets or inlets with internal supersonic compression. The first work in this direction was begun by the German scientist Oswatshka, but before his work was known in the United States, some independent work had been started at NACA under different criteria.

Some results of the NACA work are in this report, which was originally issued as a classified document in 1946. In contrast to the work of Oswatshka, the NACA had the problem of designing an inlet for a supersonic airplane. The intent was large operating range of Mach number and continuity of flow properties. The range of Mach number for the NACA work is less than the range considered by Oswatshka. Consequently, an inlet which had all external supersonic compression for the condition of optimum pressure recovery was chosen.

The use of the all-external supersonic compression type of inlet, gives the following advantages and disadvantages in comparison with radial inlet types.

- The constant-geometry inlet can operate with high-pressure recovery for a large Mach number range.
- Large variations of mass flow do not present disadvantages of pressure or entropy.

► An Experimental Investigation of the Effect of Surface Heating on Boundary-Layer Transition in a Flat Plate in Supersonic Flow (TN 2351)—by Robert W. Higgins and Combsine C. Pappas.

Since the available information on the effect of surface heating on boundary-layer transition is limited in scope, the authors felt that additional experimental data, especially for flat plates and supersonic flow, would be desirable. Wind-tunnel tests were performed at a nominal Mach number of 2.40. Data was obtained at several static temperature levels of 60°F, 140°F, 180°F and 240°F.

► The Effect of an Arbitrary Surface-Temperature Variation Along a Flat

Plate on the Convective Heat Transfer in an Incompressible Turbulent Boundary Layer (TN 2345)—by Morris W. Rebeck.

This analysis, which is rather thoroughly described in the title, refers to the effect of surface temperature variations on the heat transfer and the boundary layer along the plate.

- All physical properties of the fluid are constant.
- Negligible frictional dissipation of energy within the boundary layer.
- Boundary layer velocity distribution of the 1/7 power form.
- Boundary layer temperature distribution of the 1/7 power form.
- Local heat transfer coefficient for a constant surface temperature plate is a function of the surface temperature.

plus in the case of variable temperature, when expressed by an equation based on the local flow and thermal boundary-layer thicknesses instead of the distance along the plate.

The analysis and cited examples indicate that a variation in surface temperature along a flat plate influences the local convective heat transfer, depending on the type of variation. Generally, a sudden surface temperature discontinuity produces extremely large changes in the convective heat transfer directly downstream of the position of the discontinuity.

A continuously variable surface temperature was shown previously to have

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it's **simple**
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A smaller effect on the convective heat transfer is a sudden temperature discontinuity. For this same case, large effects on the local heat transfer coefficient could be expected only when the surface temperature approaches that of the free stream or is lower rather than the leading edge of the plate.

► Comparison of Theoretical and Experimental Response of a Single-Mode Elastic System in Hydrodynamic Impact (TN 3551)—by Robert W. Miller and Kenneth F. Minton.

Experiments with large airplanes has shown that a critical design consideration may be the elastic behavior of the

structure during landing impact. Most of the analytical methods for locating this case assume that the external load applied during the impact is not influenced by the elasticity of the structure. They further assume that the strain hardening response can be determined from the load that would have been applied if the structure were rigid.

A previous NACA technical note presented an analytical method for treating the hydrodynamic impact of an elastic structure in which the elastic force of the load and response were included. That report showed that structural flexibility could have appreciable effect on the applied load.

In this report, the significant flexibility of the structure is considered to be the flexure of the fuselage wing structure in the fundamental mode. The action can be represented by a two mass-spring system having the same frequency as the fundamental mode of the represented structure, and a mass ratio determined by the physical characteristics of the structure. No adequate experimental check was made of this earlier method, so major impact tests of an elastic model approximating the two mass-spring system were made at the Langley impact tunnel.

The results of the tests are compared in the report with theoretical load histories of impact force and response calculated by the method presented in the earlier NACA report. This earlier method considers the applied hydrodynamic load and the structural response to be independent is coupled throughout the impact. Force time histories for the elastic system and the rigid system are compared. These comparisons indicated that the theoretical results agreed well with the experimental results.

► Spin-Taxial Investigation of the Effects of Mass and Dissymmetrical Variation on the Spinning Characteristics of a Low-Wing, Single-Vertical-Tail Model Typical of Personal-Crewer Airplanes (TN 2352)—by Walter J. Kilmer and Jack H. Wilson.

This report covers part of a general investigation being conducted at the Langley 30-foot free-spinning tunnel to provide design information for propeller-bearing personal-crewer aircraft as planes for satisfactory recovery from spins. Earlier series of tests were made on a fixed tail model, another phase of the overall investigation was the presentation of design charts for proper spinning recovery for inherently spin recovery.

This investigation was conducted to provide airplane designers with spin and recovery data for a variety of design configurations. The results of this investigation have also been examined in light of the requirements set forth in Civil Air Regulations, Part 3.

The investigation showed that even at the full spinning power levels obtained by a 1/2 McGraw-Hill NACA TN 1129, 1947) is not very good, satisfactory recovery characteristics can be obtained readily. The technique which must be used is a left, rapid roll-in, followed by a 1/2 turn left by forward movement of the stick.

A variety of tests was made, including tests with changes in nose distribution of the airplane, vertical or horizontal tail design, tail-finning power factor, wing plan form, and number of propellers.

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Since protective devices may actually increase the hazards of aircraft operation in many cases, the addition of such devices must be carefully considered. Our Systems Test Laboratory, accordingly, evaluates the effect of additional protective devices on the complete system by seeking failures, to prevent their later, in actual service.



In this Jack & Heintz "test house", electrical control systems are being tested under conditions that simulate actual installations, even in wiring and layout. **BELOW**, Typical J&H Electrical Control System Panel. Five charts and a controller complete the system.



Chief Engineer's Corner

Our company designs equipment to fulfill our customers' needs, rather than equipment that can be "sold" to them. With this policy, our electrical control systems all have been designed by first consulting with the customer to learn his requirements, then initiating the design, and maintaining very close liaison between the customer's engineers and our own during the design, prototyping and testing stages.

Our engineers are obligated to choose the best release and other components available, and to combine them into the simplest, most rugged and most reliable system possible. That is why J&H Systems achieve fewer delays and less complicated circuits.

We recognize that the efficiency or

reliability of a system is not a mere estimate; knowledge of this specific application than our engineers' position could have. That is why we feel that any aircraft electrical system design must be the result of our working with the customer's engineers.

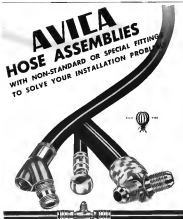
Customers are invited to be present during shakedown runs on their system, and to help us try to make the system fail, to reveal their inherent dependability.

For data on J&H Systems, address Jack & Heintz, Inc., Cleveland 11, O.

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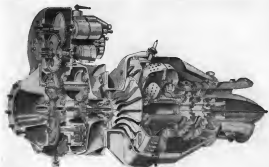
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EQUIPMENT



CUTAWAY view of the Turbomeca Orenda gas turbine. Fuel enters engine through hollow main shaft. Hollow guide blades point air to flow back to combustion chamber, and hollow tail cone supports exhaust air to rear housing for cooling.

Stratos to Produce French Baby Turbine

Developing 140 shaft horsepower, engine has potential use for pumps, starters and other auxiliary applications.

By George L. Christian

Farmingdale, L. I.—A new 140-shaft horsepower gas turbine of French design will soon be manufactured and sold in the U.S. for a wide potential of auxiliary power applications.

Stratos division, Turbomeca Engine and Auxiliary Corp., has just negotiated an exclusive licensing agreement with Turbomeca, of Pau, France, to build and sell the turbine, dubbed "Orenda," in America. This is the first agreement ever negotiated between an American and French company involving licensing for gas turbine construction.

Currently used to power an Alouette helicopter rated at 75 hp., 45 kw., 310/350 v., 400 rpm. at 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000.

you drive. And it has innumerable other potential applications. The engine is roughly comparable to the successful pusher, 175-hp. gas turbine tested last year by the Boeing Aerospace Co.

• **Turbine Features**—Here are some of the Orenda's features which attracted Stratos.

• **Combustion chamber** is the annular type. Dual speed, plugs ensure prompt reaction at starting.

• **Fuel** is injected into the center of the main rotating shaft at the secondary section and it flows through the shaft to the combustion chamber where it is sprayed through a shroud ring. Air bled off the compressor flows in clockwise air and at the point where fuel is transferred to the mixing shaft.

• **Turbine nozzle, disc and blades** are made of non-critical metals.

• **Low operating temperature** of 1,332

deg. F. (at turbine inlet) made it possible to make use of non-critical metals.

• **Specific fuel consumption** is modest—1.04 lb./shp./hr.

• **Constant speed** of the unit makes it particularly attractive as an alternator drive. Variation of rpm is 0.4% in the steady state, load on no load. No data are available now for variable load conditions.

• **Compact and Reliable**—The Orenda is relatively compact. It measures 51.7 in. overall, 20.5 in. max. diameter and weighs 831 lb. including reduction gearing.

Reliability of the engine is indicated by its current 500-hr. overhaul period. Stratos says that a 1,000-hr. overhaul period should be feasible.

Albert Beaulieu, Stratos Chief Gas Turbine Project Engineer, summed up the engine's virtues thus: "Due to high component efficiencies brought about by good hydrodynamic design of the combustion chamber and compressor (the latter being 50% efficient) the

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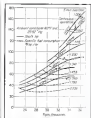
The finest equipment, workmanship and "know-how" are lavished on these vital aircraft parts. This has resulted in widespread acceptance and approval by government and civilian agencies alike.

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Onion is capable of operating at low specific fuel consumption and the low turbine temperature of 1,142 deg. F.

Onion, used by the French to power the machine, is also used in a low speed engine at 1,142 deg. F.

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"Public acceptance of this twin-engine transport's pressurized cabin comfort and its long-range speed is reflected in load factors experienced on these aircraft since we placed them in service June 1, 1950. The Comstar's greater passenger capacity since has enabled us to operate with more profitable payloads."

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ber of Nimitz D alloy. Fuel is injected through a rotary disc.

• Turbine-Axial flow, two-stage type fabricated steel casing with 24 axial guide vanes and 27 rotor blades of 23-CNT-18 steel. Two rotor discs made of Nimon 6 or AIVS 7 steel bolted together. Each disc has 21 unsealed blades of same material. Oil temperatures are 1,202 deg. before turbine and 1,022 deg. after turbine at 15,000 rpm.

• Exhaust nozzle—Variable area type. Guide casing is steel and inner cone is movable. Outlet delivers exhaust gases at a maximum speed of 510 ft./sec. (The unit under study at Stratton did not have the movable exhaust nozzle feature).

• Fuel System—Low pressure system. Fuel is sprayed by centrifugal force through nine holes in the rim of a ducted injector disc mounted on the hollow compressor-turbine drive shaft which serves as fuel manifold. Fuel is supplied under pressure by one Martin-Moeller low noise fuel pump at 57 psi.

• Control system—Turbomaster auto mixer, fly-ball type governor maintains speed within 0.4% of desired rpm. • Lubrication—Dry ring system. Turbomaster pump supplies oil at 21 psi. Two scavenge pumps are provided, one for the fuel the other for the acft bearing. A centrifugal pump is supplied to prevent the oil from emulsifying. Normal oil consumption is 0.4 lb./hr.

• Starting system—A two hp. electric starter is provided, also a heater coil and two glow plug. Engine is started and operated manually on JP-1 jet or glow fuel. Push started the engine on propane, then switched to kerosene.

• Rating—Maximum, for five min., 160 shp at 16,000 rpm at sea level. Not valid for continuous operation 150 shp at 15,000 rpm at sea level.

• Powertrain—Main power takeoff may be provided with maximum gas rates of 3.751 or 14.51. Auxiliary section provides for three additional power takeoffs plus a tachometer pul.

• Mounting Points—Three shock-absorber mounting points are provided, two in the gas turbine bearing and one in the low section behind the sheet metal combustion chamber housing.

A feature of the new bearing is its cooling. Outside air is induced to the bearing through three hollow struts supporting the ball cone, thus relieving its temperature appreciably and promoting longer life.

The bearing supports are articulated at both bearing and bearing attachment points to permit the bearing to expand and contract with thermal variations without imposing stresses on the engine's structure.

► The Ramon Wigg—Adapt why Stratton



B-50

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underfoot, to build the C-124 and under license, the four engines pointed out that the turbine-powered Stratus to enter the field of gas turbine construction with a tested unit ranking with the best on the market as a indication of time. Moreover, this type of construction fitted nearly every Stratus' specialty of designing and building until now, high speed, light air turbo machinery. The C-124 will be the first Stratus turbine with a line in it.

TWA Shifts Radio Repair to N.Y. Firm

Much of TWA's radio repair work, formerly done at Kansas City, has been given to a New York concern as a result of the Kansas City Road that inundated the carrier's main overhaul facilities. The company is South Market Engineering Co. Man Radio is also getting a share of TWA's radio overhaul work.

Paul Woodward, South Market's chief engineer, told *Aviation Week* that it started overhauling TWA's radio equipment at once as the airline was hit by the flood. Its date it has done over \$1,000 worth of business, he estimated. It marked the first time South Market had contracted for volume airline work.

► *Other Airline Work*—It gets radio repair, electrical design, engineering and installation are not new to the company. Starting some 45 years ago with specialized marine electrical and radio work, South Market branched out into the aeronautical field immediately after the last war. Post war jobs were nation designs and installation of complete radio systems in executive aircraft. This soon led to manufacturing this equipment separately installed plus radio gear put in by other shops.

Next step beyond customer radio installation and repair was servicing on-

line electrical systems. Examples are: Fairchild Kolls and Prince Beachhead of Holland's DC-3s, which were overhauled from 12 to 24v systems. "Good radio radio systems were also installed." ► *Overhaul Shop*—South Market has its overhaul shops in the Midland Air Service hangar at Vanhook, N. J. Those it has built spread pieces in its shop soon to test almost every known type of aircraft radio equipment. And space growth exist to accommodate new work as they are introduced on the market.

C. J. Neen pointed out a Collins Test Set 459 U.1, being that except for airline-owned units, it was probably the only such piece of equipment available on the East Coast to test certain radio gear. The set will check R3 in 10-15 and 175-cycle phase system. It will also test the color range of each equipment and all communications frequencies from 100 to 140 mc.

Woodward cited a job recently done on a large oil company's DC-3 as the most elaborate radio installation ever made by his company. It included 2 Collins 185 transmitters, 1 Collins 51-82 navigation set complete with OMI and RMI for navigation, 1 Collins 51-82, 1 Collins 51-81 glide path receiver, 1 Collins 17-2 150 channel VHF transmitter, 2 Collins MN-6 A ADF receivers with MN-6A tone and loop, 1 Bendix RAO-100 range receiver with MN-24 loop, 1 Bendix MN-5-B under license receiver, and 1 South Market custom built radio radio receiver.

The firm has not received an order to overhaul \$10,000 worth of radio equipment in a new Dash 18.

Although 90% of the company's current business is non-aeronautical, Woodward believes that this percentage will become more heavily aeronautical in the future, especially since the Kansas City Road has shifted TWA's business into SM's lap.



Passenger loading United Air Lines Boeing Stratosphere in Houston air base, thanks to this large power unit. Delivering

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up to 2,500 tons, the pre-engineered system to operate the coils as a cooling system while ships are on the ground.



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The new *Shear* steel collar...

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See your Standard Engineer for roll-out members and design alternatives.

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NEW AVIATION PRODUCTS



Fighter Cockpit Seal

Devising a practical method of tightly sealing the joint between bubble-type canopies and the fuselage to prevent reflective penetration of the cockpit, yet allow easy ejection of the canopy, has been one of the knotty problems in modern jet high altitude flight.

R. F. Goodrich Inc. has solved the problem with development of its new Inflatable Strip Seal. This is essentially a specially fabricated inflatable tube with channel configuration. Special tie, tie, failure, rubberized on both ends, is vulcanized to the collapsed position to a flexible rubber channel type face. When inflated, the rubberized fabric lifts to its maximum sealing position with little or no stretching of the fabric.

An airtight seal required for inflation is only a few pounds even at those high altitudes. With this design, the seal is tight enough to cover almost any pressure action of the cockpit and prevent any air flow from high altitude blow-off jet ports into a minimum separating face between canopy and fuselage.

Importantly, the extra high lift ratio of the seal makes it easy to clean, when deflated, permitting easy opening and closing of the canopy. According to Goodrich, the rubber compounds used are "dry" and most weathering. The seal has been approved by the Air Force for the most advanced fighter aircraft the company advert. It also can be used as a sealant seal between fuselages and detachable wing "jacks" or pods.

R. F. Goodrich Co. Akron, Ohio

Instrument Component

A member of the potentiometer designed to combine "reasonable accuracy at reasonable cost" is being re-

lated by Van Dyke Instruments, Inc.

The unit, Model H-50, has a 1.5 ohm resistance element contained in one 1/2 in. diameter. The unit is intended primarily for use in precision bridge-balancing circuits and similar applications where the potentiometer is subjected by means of an isolated circuit.

The shaft moves linearly in and out when rotated. Any setting can be maintained at accuracies up to .001, the output zero. Shift and zero are electrically controlled. The unit is designed to be supplied by receiving an external power. The new potentiometer has a performance now equalled only by instruments several times as costly. Contact Van Dyke. Price is expected to be between \$2.50 and \$4.00 each. Van Dyke Instruments Inc., 1227 First Ave., St. Petersburg 1, Fla.



Water Injection Valve

A check valve (plunger type) for water injection systems is usually a long tradition in Allen Aircraft Products, Inc.

The aluminum alloy valve weighs less than 1 lb. has a specially treated interior for maximum corrosion resistance. Built for a proof pressure of 1,000 psi and operating pressure of 500 psi, it is constructed in the open position and closed at three psi reverse pressure. Pressure loss is less than 75 psi at 60 gals. Valve spring loaded in the closed position also is available. All is designed to give satisfactory operation through temperatures ranging from -65 to +140° F.

Allen Aircraft Products Inc., Redwood, Ohio

Stronger Filters

Filters for aircraft hydraulic systems, capable of handling pressures up to 1,000 psi and more rugged than their predecessors have been developed by PerkinElmer.

The new line of filters can be used where pressure pulsations occur. This has been made possible by building them with stronger housing and eff-

icients. They are made of aluminum bar stock and meet all specified specifications, but and least pressure, the order says. Elements, interchangeable with those in compatible units of the same general type series, part AN-6135.

Filters are available in 1, 2, 4 and 12 mesh models, designated respectively, 70-401, 70-401-2, 70-401-4 and 70-401-12. Efficiency in these units varies high, says PerkinElmer.

PerkinElmer Products, Inc., Raleigh, N. C.



Latch for Aircraft

A flush fitting, heavy duty screen latch is being manufactured by Sonosword.

The aircraft latch is a modified design, all purpose version of the High Strength Closing Latch, also produced by Sonosword. It is designed for flat panels, for use on cargo doors, radomes, instrument compartments and other access locations. It consists of two sections, the housing and a toggle assembly (see inset photo). Toggle pressure opens the latch.

The unit weighs 1.5 lb., is designed to carry 2,700 lb. loading load in tension and 1,800 lb. in shear.

Sonosword Aerospace, Inc., Tarrytown, N. Y.

ALSO ON THE MARKET

Aer-O-Film 98, liquid type mechanical film for outgassing petroleum products first also is said to be specially effective against fumes caused by hydrocarbon, nitrogen, carbon, hydrogen and other "Noxious" fumes. Sonosword Aerospace, Inc., West Chester, Pa.

Tinag (nickel, 80% tin) hydroxide type is a substance used in designed for use in free standing in applications involving electrical light loads. At given frequencies, it is better than comparable dielectric, offering no dielectric loss required, alternate problems are eliminated under class. Raydon Mfg. Co., Inc., Farmington, Conn.

No difference is required to produce "black and white" photographic images from blue light. It can use new Kodak-type Kodak Negative paper. Also, using it with composition "Autopositiv" paper, you can reproduce on positive photographic substrates all your cyanotype prints. Specifications of type of original available. See Eastman Kodak Co., Rochester, N. Y.



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180 Channel WILCOX Communications System Chosen for Eastern's Entire Fleet of SUPER CONSTELLATIONS and MARTIN 4-0-4's

Eastern Air Lines demanded the finest communications equipment available to match the advanced, efficient operation of their modern new fleet. No greater complement could be paid to Wilcox radio equipment than to be selected for the challenging assignment.

The Wilcox 442A VHF Communications System covers all channels in the 118-136 Mc. band. It is light in weight, small in size, and easy to maintain.

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The 50-watt transmitter, high sensitivity receiver, and compact power supply are each contained in

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All transmitter and receiver functions are available by remote control. A new channel selector system assures positive operation and minimum maintenance.

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Simple, conventional circuits minimize the number and types of tubes and require no special tuning techniques, or test equipment.

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AIR TRANSPORT

Revolt of the Pilots—IV

New ALPA to Press Mileage Issue

Attempt to make distance flown the basis of monthly wage is tied to alleged fatigue factor of faster planes.

By William Kruger

A new factor, mileage measure of distance, is reviving all former concepts of an airline pilot's working conditions, and this one may well dominate negotiations between airline management and the Air Line Pilots Assn. for years to come.

Management, while it may rebel at the suggestion of this move into its contract bargaining, might as well prepare to face it, once before they complete the reorganization of ALPA (Aviation Week, Aug. 20, p. 61). President Clarence N. Sayon and his associates will be meeting open recognition of the mileage income determination process.

►The French-Mileage income determination, as Sayon explains it, is a scientific formula for determining pay on the basis of the number of miles flown each month, and increasing the basic number of miles flown with use of faster aircraft. To the unions, it is a method to limit the number of miles they can fly each month.

The only limitation at present on the use of a pilot is that he cannot fly more than eight hours a day and more than 16 hours a month. To the airlines, that means he should fly 85 hours a month. To the pilots that is a maximum set in other, less strenuous days.

The move came up in the American Airlines' Presidential emergency board hearings, and Sayon says that is the discussion of a possible future 1,000-mile cap, but airplanes the pilots ought to fly each a plane \$1,000 a month. American, however, said that as a pilot should fly 85 hours a month, a 1,000-mile airplane should be flown 85,000 mi a month.

That is the difference between the pilots and the airlines. For another view, United Air Lines' W. A. Patterson rejects the mileage income determination proposal because, he says, pilots will have a right to be concerned about jet and turbo-prop planes when they arrive. "How can we be prejudiced about a problem we don't understand yet?" he asks. "We can't settle transportation's problems today."

Such a demand of the move is more troubling to the pilots than an economic argument against the formula. For one

of their fears is Decision 51 of the National Labor Board (predecessor of National Labor Relations Board), and one sentence in that document reads:

"Experience has not established sufficiently to put a maximum on the monthly mileage of an employee."

That opinion was rendered 27 years ago. Pilots say the time now has come to draw on the past experience of no limitation of new equipment and no rules for the future.

It was Decision 51 that fired the 85-hr. limitation that the pilots now are trying to shake. It also laid down the fundamental arguments the pilots now use in seeking mileage income determination (see box on next page).

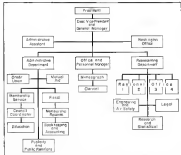
►Fuelled as Fatigue—The airlines, currently, want 85 hours a month to be the basic working condition for pilots. If a pilot flies 85 hours a month on large, fast airplanes, the airlines are paying in more revenue than that pilot's labor. And, the unions claim, that is a "fair" condition. To the airlines, that is the best advantage of technological improve-

Special Report

What's behind the change in leadership of the Air Line Pilots Assn., and what does it mean? The airline industry and organized labor have been studying that question ever since early last July morning when David C. Belandine died he had been "reelected" from his presidency of the union. For several months, Wilcox sent a staff member to Chicago where he talked at length with ALPA's officials and employees, and obtained the only exclusive interview Belandine had granted on the union even before. The result is a special report, in four weekly installments which began Aug. 6, the last of which appears on these pages.

ments in which, they are willing to pay that pilot more, enabling him to share in the greater productivity. The union says this involves a risk on their part, the airline he is flying is a far more costly piece of equipment than it used to be.

The pilots' attempt to make miles flown a month the basic working condition, says management, is an attempt to substitute technological progress. It is "bureaucratic," the case of the railroad, and airline management is



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occupy the same office in the back of the building, he used as executive vice president, because Schacka has not relinquished the key to the president's office.

Diagonally across the street, above a hardware store, is the "Administrative Department," which includes control coordination, engineering, employment agreements, accounting, personnel and recruitment, education, legal and pension. On the same side of the street, a few doors from Kodak Ave. and above a five and ten-cent store is the publicity department and the office of the affiliate unions.

The three walkways are fully staffed and equipped, but they are as neatly unencumbered and unobstructed between them as is accurately measured that walk is kept open. The headquarters has outgrown its surroundings.

Similarly, ALPA has members well-equipped to handle intelligently all the problems confronting pilots today, but in the past few weeks, and conversations among them has been languished by the resignation of the association, with one man trying to carry the entire load. And in Seay's view, the pilots out on the line also have outgrown their surroundings—Deason 23.

ALPA's own working conditions will be improved when the new headquarters building is ready, probably late this year or early next year. To Seay and his colleagues, the pilots' working

conditions will not be improved until adequate revenue determination is no longer an issue but a rule that pilots fly by.

ATA Studies Pool of Carrier Spare Parts

Members of Air Transport Association are making preliminary reports to ATA on whether they want a cooperative pool of low inventory inventory items—so-called "insurance" items.

The idea of maintenance supply pooling by the airlines has been spotted by ATX's Edward Kelly and by Capital Airlines and Pan American World Airways.

Preliminary survey the airlines are now working on would list all "insurance"-type maintenance and repair items worth \$500 or more for per-hour type turnpikes. Survey will show how many parts are available, their unit value, whether or not they are practical for pooling with other airlines, and whether an item is so modified by one airline that others couldn't pick it up from the parts pool. All engine parts and accessories are excluded, because maintenance is too active to make pooling of these practical.

Airlines are turning in individual reports to Kelly, executive secretary of the ATA Airlines Finance and Accounting Conference.

The survey will show if there are

enough "insurance" items carried by each airline to justify pooling. If the airlines decide there are, they plan to set up a pool for a regional warehousing cooperative. For example, United might stock little end spares like valves with outlets in the Chicago area, Eastern in the Miami area, TWA around Kansas City, Capital in Washington. Research on the project is handled by the ATA stock and stores subcommittee, in collaboration with airline purchasing departments.

The idea has been discussed for years. Before rapid growth in value, complexity and variety of airlines' investment in spare parts on board and on order gave the airlines a final push to decide now whether or not pooling will save money or both inventory money and operating efficiency.

Some airlines have been skeptical about the system. They say that when an airline needs a part, it is needed right away, and airlines modify orders parts to suit their own preferences, thus making them one-of-a-kind.

PAA Liberia Crash Cause Still Unknown

Pan American World Airways has not reached any conclusion as to the probable cause of the Constellation crash in Liberia last June which killed all 18 passengers and crew of size.

PAA's Liberia disaster assigns Horace Brock, said at the recent Civil Aeronautics Board accident hearing that the plane was "properly cleared, maintained and flown" pilot, Captain Frank Crawford, had 7,857 flying hours and had made previous trips over the fatal route, plane had eight hours reserve fuel when it crashed.

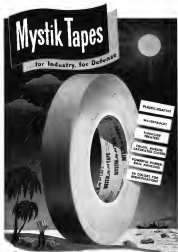
Pan Am had operated in Africa for ten years without a crash or injury, and had operated around the world for over three years without failure.

New York-Havana Permit to Cubana

The Civil Aeronautics Board is a 5-to-2 decision, has given a Havana New York air service permit for three years to Compañia Cubana de Aviación.

Cubana is just owned by Pan American World Airways. It will compete with National and Eastern. So CAB wants, in granting the permit, that Pan Am and Eastern should not reveal their relationship in publicity or help each other in sales. Pan Am is also to continue diverting half of its 417th stockholding in Cubana.

CAB Examiner J. Earl Cox had recommended Cubana for a five-year permit, over the other two applicants—American "Q" and Express Airline International.



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ambulance service at terminal points must be made by the personnel. C-55 has used the facility for flying a number of stretchers over to terminal centers. When one is in the bed is carried in the Constellation's emergency.

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Foreign Aircraft Picture Highlights



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